

CLAIMS

What is claimed is:

1. A method comprising:
splitting an incoming optical signal into a first and a second optical signals;
sending the first and the second optical signals to a first and a second equipments
in an optical network node, respectively, the second equipment being a protection module
for the first equipment;
monitoring a first and a second outgoing optical signals from the first and second
equipments; and
declaring a failure of the optical network node if only one of the first and the
second outgoing optical signals has failed.
2. The method of claim 1, further comprising:
bypassing the first optical equipment if the first optical signal has failed and the
second optical signal has not failed; and
bypassing the second optical equipment if the second optical signal has failed and
the first optical signal has not failed.
3. The method of claim 2, further comprising sending an alarm if either the first or
the second optical signal has failed.

4. The method of claim 1, further comprising declaring a failure outside of the optical network node if both the first and second optical signals have failed.
5. The method of claim 1, further comprising amplifying the first and the second optical signals at the first and second equipments, respectively.
6. The method of claim 1, wherein each of the first and second equipments comprises a wavelength switch module.
7. The method of claim 6, wherein each of the first and second equipments further comprises a multiplexer and a de-multiplexer.
8. The method of claim 7, wherein each of the first and second equipments further comprises a plurality of amplifiers.
9. A machine-accessible medium that stores instructions which, if executed by a processor, will cause the processor to perform operations comprising:
 - splitting an incoming optical signal into a first and a second optical signals;
 - sending the first and the second optical signals to a first and a second equipments in an optical network node, respectively, the second equipment being a protection module for the first equipment;
 - monitoring a first and a second outgoing optical signals from the first and second equipment; and

declaring a failure of the optical network node if only one of the first and the second outgoing optical signals has failed.

10. The machine-accessible medium of claim 8, wherein the operations further comprise:

bypassing the first equipment if the first optical signal has failed and the second optical signal has not failed; and

bypassing the second equipment if the second optical signal has failed and the first optical signal has not failed.

11. The machine-accessible medium of claim 10, wherein the operations further comprise sending an alarm if either the first or the second optical signal has failed.

12. The machine-accessible medium of claim 9, wherein the operations further comprise declaring a failure outside of the optical network node if both the first and second optical signals have failed.

13. An apparatus comprising:

a first optical equipment in an optical network device having a first plurality of input ports and a first plurality of output ports;

a second optical equipment in the optical network device having a second plurality of input ports and a second plurality of output ports, the second optical equipment being a protection module of the first optical equipment;

a plurality of optical signal splitters, each of the plurality of optical signal splitters coupled to one of the first plurality of input ports and one of the second plurality of input ports, to split an incoming optical signal into a first and a second optical signals and to input to the first and the second optical equipments, respectively; and

a plurality of optical signal switches, each of the plurality of the optical signal switches coupled to one of the first plurality of output ports and one of the second plurality of output ports, to select a first output optical signal from the first optical equipment or a second output optical signal from the second optical equipment, wherein the plurality of optical signal switches are switched together substantially simultaneously.

14. The apparatus of claim 13, wherein the optical signal switch selects the second output optical signal from the second optical equipment if the first output optical signal from the first optical equipment fails and the second output optical signal from the second optical equipment has not failed.

15. The apparatus of claim 13, wherein the optical signal switch selects the first output optical signal from the first optical equipment if the second output optical signal from the second optical equipment fails and the first output optical signal from the first optical equipment has not failed.

16. The apparatus of claim 13, wherein each of the first and the second optical equipment includes a wavelength switch module.

17. The apparatus of claim 16, wherein each of the first and the second optical equipment further includes a multiplexer and a demultiplexer.

18. The apparatus of claim 17, wherein each of the first and the second optical equipment further includes a plurality of amplifiers.

19. A system comprising:

a plurality of optical fibers; and

a plurality of optical nodes coupled to each other via the plurality of optical fibers, each of the plurality of optical nodes comprising:

a first optical equipment in an optical network device having a first plurality of input ports and a first plurality of output ports;

a second optical equipment in the optical network device having a second plurality of input ports and a second plurality of output ports, the second optical equipment being a protection module of the first optical equipment;

a plurality of optical signal splitters, each of the plurality of optical signal splitters coupled to one of the first plurality of input ports and one of the second plurality of input ports, to split an incoming optical signal into a first and a second optical signals and to input to the first and the second optical equipment, respectively; and

a plurality of optical signal switches, each of the plurality of the optical signal switches coupled to one of the first plurality of output ports and one of the second plurality of output ports, to select a first output optical signal from the first optical

equipment or a second output optical signal from the second optical equipment, wherein the plurality of optical signal switches are switched together substantially simultaneously.

20. The system of claim 19, wherein the optical signal switch selects the second output optical signal from the second optical equipment if the first output optical signal from the first optical equipment fails and the second output optical signal from the second optical equipment has not failed.

21. The system of claim 19, wherein the optical signal switch selects the first output optical signal from the first optical equipment if the second output optical signal from the second optical equipment fails and the first output optical signal from the first optical equipment has not failed.

22. The system of claim 19, wherein each of the first and the second optical equipment includes a wavelength switch module.

23. The system of claim 22, wherein each of the first and the second optical equipment includes a multiplexer and a demultiplexer.

24. The system of claim 23, wherein each of the first and the second optical equipment includes a plurality of amplifiers.